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EPAct Light Duty Fuel Effects Test Program

Experimental Design Proposals

Aug 15, 2007

Draft – Do Not Distribute

OTAQ Fuel Testing Strategy

- Separate but overlapping programs to examine:
  - LD exhaust & evap, with the focus on Tier 2 vehicles
  - Nonroad exhaust & evap
- The data will be used to develop an up-to-date fuel effects model, which feeds:
  - MOVES (SIP, inventory and air quality analyses)
  - EPAct studies (anti-backsliding, fuel harmonization)
  - Future regulatory programs, legislative and policy discussions

Purpose of Light Duty Exhaust Program

- Recent and on-going programs from CRC and others:
  - Covered only subsets of fuel parameters of interest
    - Minimal ability to cover a wide range of interactions simultaneously
  - Included few Tier 2 vehicles

- Scope of a program to fit our data needs
  - Evaluate main and interactive effects of ethanol, RVP, T50, T90, aromatics and olefins on exhaust emissions
  - Test at multiple temperatures (e.g. 50ºF and 75ºF)
  - Focus on Tier 2, but also include LEV, Tier 1 and high emitters
  - Collect regulated pollutants as well as speciated VOC, speciated PM, and sec-by-sec data

Scope of the Program as Currently Drafted

- Budgetary constraints forced us to limit our proposal

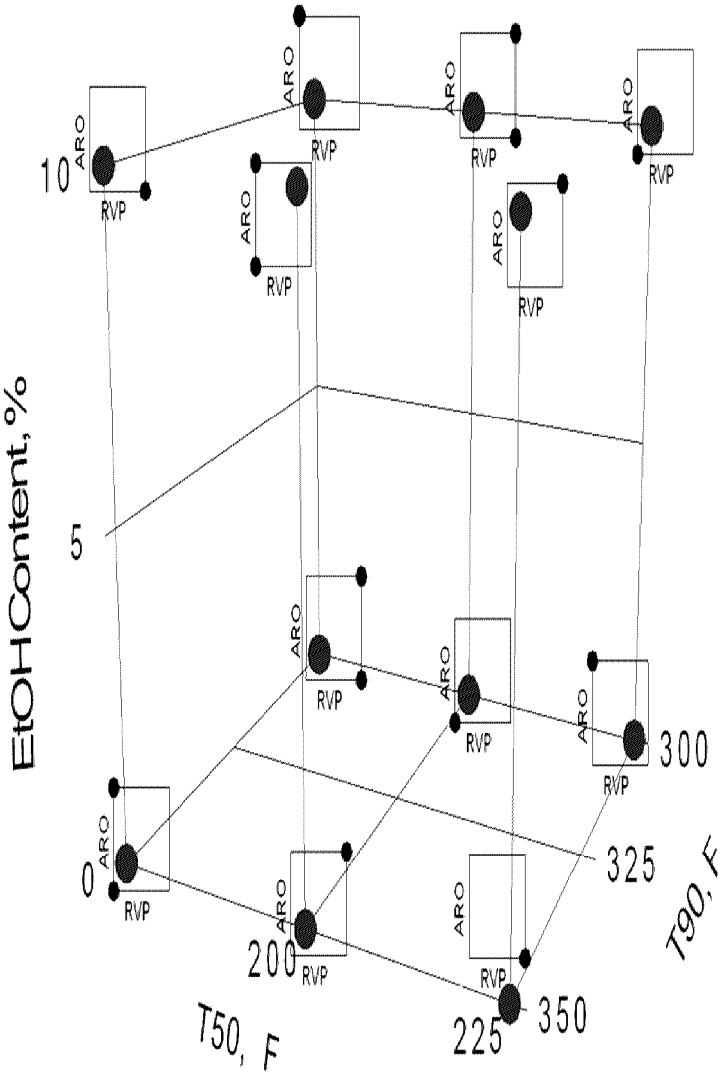
- As it stands our proposal gives us:
  - Multiple fuel parameters with evaluation of key interactions
    - Ethanol (E0 and E10 only), RVP, T50, T90, aromatics
  - Test fleet of approximately 20 Tier 2 vehicles (Bin 5 average)
  - Limited VOC and PM speciation on a subset of fuels and vehicles

- Limitations of this program
  - No sulfur effects or high-level ethanol blends
  - No low-temperature testing (e.g. 50ºF or 20°F)
  - Will not resolve all the interactive and nonlinear effects
  - Limited number and type of vehicles (Tier 2 only)

Base Modular Fuel Matrix

5 variables, 3x2x2x2x2, 17 fuels, G-Eff: 83.6%

RVP range: 7-9 psi; Aromatic content range: 25 – 40%



Ex. 5 - Deliberative/Ex. 4 CBI

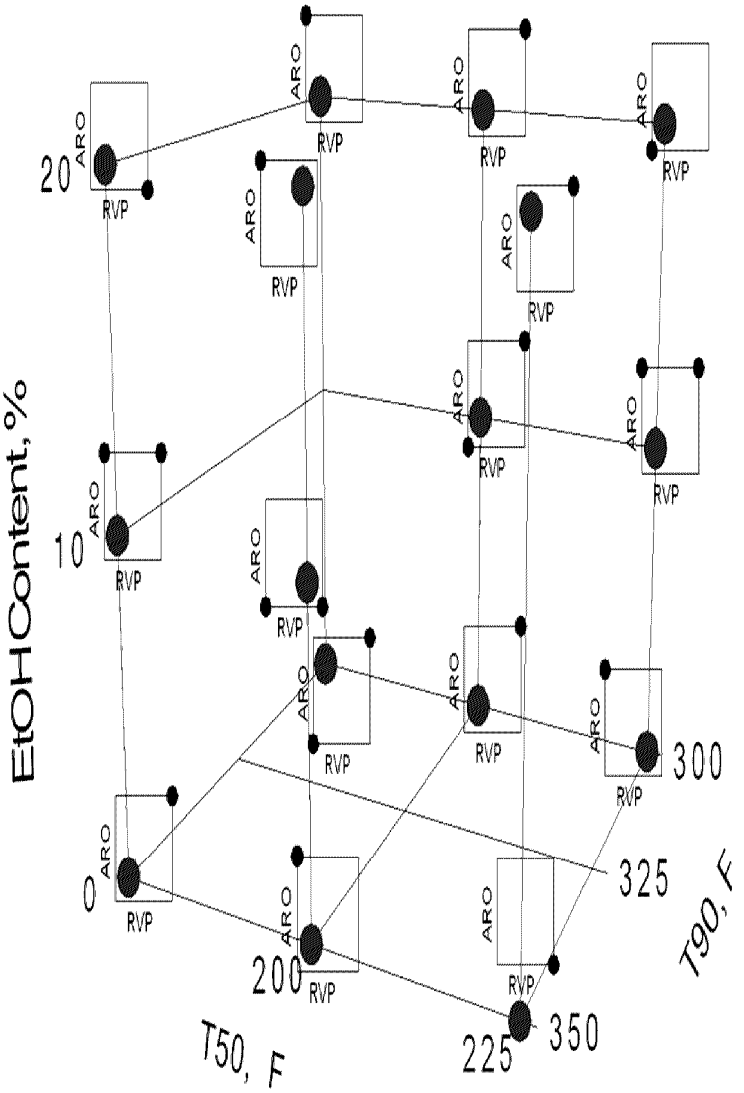
Expansion of Light Duty Exhaust Program

- The original objectives and scope of this program could be met through incorporation of the following:
  - E20 and E85 blends
  - Additional fuels to increase the resolution of interactive and nonlinear fuel effects
  - Additional tests at 50°F, highlighting potential issues with higher level ethanol blends
  - FFVs and high emitters
  - Expanded scope of VOC and PM speciation

Optimized Full Fuel Matrix

5 variables, 3x3x2x2x2, 21+2(E85) fuels, G-Eff: 69.6%

RVP range: 7-9 psi; Aromatic content range:



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